

**S/NUnknown**

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant:	Kum F. Leong et al.	Examiner:	Unknown
Serial No.:	Unknown	Group Art Unit:	Unknown
Filed:	Herewith	Docket No:	884.A68US1
Title:	DIFFUSION BARRIER LAYER FOR LEAD FREE PACKAGE SUBSTRATE		
Assignee:	Intel Corporation	Customer No.:	21186

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**PRELIMINARY AMENDMENT**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Prior to taking up this Application for examination, please make the following paragraph substitution in the specification:

Please amend the paragraph beginning at pate 5, line 16 as follows:

Figure 3 is a cross-sectional view of a portion of the substrate 100 a long line 3-3 in Figure 1, according to an embodiment of this invention. The pad 130 has a surface 131 covered by a diffusion retarding layer 140. Figure 4 is a close up cross-sectional view of the pad 130 and the surface finish on the surface 131 of the pad, according to an embodiment of this invention. Figure 4 is the portion of the pad 130 that is circled in Figure 3. Now referring to both Figures 3 and 4, the surface finish on the pad 130 will be discussed in more detail. The pad 130 is made of copper or a copper alloy. A diffusion-retarding layer that includes a formulation of 54 Fe-29Ni/17Co is placed on the surface 131 of the copper pad 130. The diffusion-retarding layer that includes a formulation of 54 Fe-29Ni/17Co is available from Carpenter Technology Corporation, 2 Meidian Boulevard, Wyomissing, PA 19610-1339 U.S.A. under the trademark Kovar® (registered trademark of Carpenter Technology Corporation). The diffusion-retarding layer that includes a formulation of 54 Fe-29Ni/17Co is also indexed by a UNS number K94610 from the Carpenter Technology Corporation. The diffusion-retarding layer does not bind well to the copper pad 130. Therefore, a layer of titanium 410 is placed over the copper pad 130. Specifically a layer of titanium of approximately 80 to 120 nm is placed on to the surface 131 of the copper pad 130. The diffusion-retarding layer 140 is then placed onto the titanium layer 410. The titanium layer 410 binds the diffusion-retarding layer 140 to the copper pad 130 and specifically to the surface 131 of the copper pad. The diffusion-retarding layer is approximately